METHOD AND ARRANGEMENT FOR THE CONTINUOUS MANUFACTURE OF PROFILED LIGNOCELLULOSE-CONTAINING BOARD OR STRIP-LIKE PRODUCTS

FIELD OF THE INVENTION

[0001] The present invention relates to a method of continuously producing profiled lignocellulose-containing board or strip-like products. More particularly, the present invention relates to apparatus for carrying out such a method.

[0002] A common way of producing profiled structural elements, such as skirting boards, cornices, window linings, architraving or furniture components and the like is to plane or mill the desired profile either from solid wood or from fiberboard, preferably MDF (Medium Density Fiberboard). The unsuitability of using this technique to mill such products from medium density fibreboard is obvious. Firstly, it would involve a production chain and transport chain consisting of many expensive intermediate steps and operations, and it would mean that the profiled product would have different cross-sectional densities and for that reason absorb different amounts of paint or varnish at discrete locations. The milling operation would also result in high material losses. For instance, more than 50% of the starting material can be lost when milling products to pronounced profile depths.

[0003] A standard example of this production chain may be as follows: Dried and glue-coated fibers are produced in the MDF plant and shaped into mats which are pressed into boards which are then edge-trimmed and ground. Losses are experienced in the form of edge trim and dust from the grinding operations. The next link in the production chain consists of transportation of board to the production unit for the profiled products. In the third link, the medium density fibreboards are sawed into strips which form the starting blanks for the profiled products, these starting blanks being milled and ground as well as lacquered with layers of paint or varnish or are coated with some type of film for priming or decoration purposes.

[0004] One object of the present invention is to avoid the drawbacks associated with the aforesaid production process in an economical fashion and, instead, to provide a continuous process up to the finished profiled product with as little material loss as possible.

SUMMARY OF THE INVENTION

[0005] In accordance with the present invention, this and other objects have now been realized by the invention of a method for continuously providing profiled lignocellulose-containing boards comprising providing a mat of disintegrated, dried and glue-coated lignocellulose-containing material, the mat including a pair of outer surfaces, providing at least one of the pair of outer surfaces of the mat with a predetermined surface profile, and pressing the mat into a board with a steam injection press while maintaining the predetermined surface profile on the at least one outer surface of the board. Preferably, the method includes providing the mat having a bulk density of from 20 to 200 kg/m^3.

[0006] In accordance with one embodiment of the method of the present invention, the method includes pre-compressing the mat while maintaining the predetermined surface profile of the at least one outer surface of the mat prior to the pressing step.

[0007] In accordance with another embodiment of the method of the present invention, the method includes dividing the board into strip-like board products prior to the pressing step.

[0008] In accordance with another embodiment of the method of the present invention, the method includes varying the density of the board across the at least one outer surface of the board.

[0009] In accordance with another embodiment of the method of the present invention, the method includes providing the mat with a predetermined surface profile on both of the pair of outer surfaces of the mat.

[0010] In accordance with the present invention, this and other objects have also been realized by the invention of apparatus for continuously providing profiled lignocellulose-containing boards from a mat of disintegrated, dried and glue-coated lignocellulose-containing material having a pair of outer surfaces, the apparatus comprising forming means for providing the mat with a predetermined surface profile on at least one of the pair of outer surfaces, and a steam injection press for pressing the profiled mat into a board, the steam injection press including at least one roll having a first surface profile across its width, and surface densifying means for increasing the density of the at least one surface of the board, the surface densifying means including at least one roll having a second surface profile across its width. In a preferred embodiment, the predetermined surface profile of the forming means corresponds to the first surface profile, and the second surface profile has a diameter greater than that of the first surface profile at predetermined extreme points thereon.

BRIEF DESCRIPTION OF THE DRAWING

[0011] The present invention will now be described in more detail with reference to the following detailed description which, in turn, refers to the accompanying drawing, in which:

[0012] The figure is a side, elevational, schematic, longitudinal section of a plant in accordance with the present invention, with four separate cross-sections shown in larger scale.

[0013] The plant shown in the drawing is based on the plant illustrated in Swedish Patent No. 502,272, which describes a continuous steam injection process. Disintegrated, dried and glue-coated lignocellulosic fiber material is delivered to a forming station 1 and there formed into a fiber mat 3 which is fed into a steam injection press 2. The fiber mat is pressed in the press into a board product 4 which is hardened, or cured, to an extent at which the board is solid and has a given mechanical strength. The surfaces are further densified

in a surface densifying unit 5. This process results in board that has a dense outer surface.

[0014] According to the present invention, the plant is designed for the production of profiled board or strip products in one and the same two-step process. To this end, a milling or cutting roll 6 is arranged between the forming station 1 and the steam injection press 2. The cutting roll 6 functions to impart a profiled surface structure to the lignocellulosic, glue-coated starting material in the form of the fiber mat 3 that has a density of between 20 and 200 kg/m^3. To this end, the diameter of the cutting roll 6 varies across its width. The profile imparted to the cross-section of the mat will substantially coincide with the cross-section of the finished product. The profiled mat 3, which may be precompressed, is transported continuously into the steam injection press 2. This press includes a profiled steam roll 7 that has the same profile as the cutting roll 6. The mat 3 is thus compressed therein and hardened to form a board or strip 4 that has the intended cross-section, by injecting saturated or superheated steam into the mat. The surface layers are further compressed in a second step, by allowing the board or the strip 4 to pass through the surface densifying unit 5 that includes one or more hot, compression roll-pairs 8 that have the same geometry as the steam roll 7, but a smaller cross-sectional area so as to obtain the desired surface compression. The surface temperature of the roll pairs 8 may lie between about 100 and 350°C, preferably between about 150 and 250°C.

[0015] The drawing shows the cross-section 9 of the formed fiber mat 3 prior to profiling the mat. The cross-section 10 downstream of the cutting roll 6 illustrates the profile of the upper surface. Downstream of the steam injection press 2, the board 4 pressed therein will have the cross-section 11, and the surface sheet in the cross-section 12 downstream of the surface densifying unit 5 will have a higher density, but the same profile.

[0016] The underside of the board can be profiled with the same technique. In this respect, a cutting roll 6 is also arranged on the other side of the fiber mat 3 and the lower rolls, 7 and 8, in the steam injection press 2 and the surface densifying unit 5 are provided with the same surface profile as the lower cutting roll across the respective widths thereof.

[0017] It may be of interest in certain applications to provide certain parts of the profile with a greater density, e.g. on exposed tops. This is made possible by allowing the profile on the rolls, 7 and 8, to deviate from the profile on the cutting roll 6 at these points.

[0018] In one alternative embodiment, the board or the strip produced in the first step, i.e. in the steam injection press, can be divided into several narrower strips in a continuous process, these narrower strips are then being passed through one or more hot roll pairs 8 in the surface densifying unit 5. Separation of the board or strip into a plurality of strips may be effected by sawing, for example.

[0019] The present invention enables the production of profiled lignocellulose-containing products in the form of boards and strips of uniform density throughout the whole of their cross-section and with dense surfaces that absorb equal amounts of paint over the entire product in a rapid and continuous process. Furthermore, this is achieved in the absence of losses in starting material, apart from the small losses that occur when sawing the board or strip.

[0020] Although the invention herein has been described with reference to particular embodiments, it is to be understood that these embodiments are merely illustrative of the principles and applications of the present invention. It is therefore to be understood that numerous modifications may be made to the illustrative embodiments and that other arrangements may be devised without departing from the spirit and scope of the present invention as defined by the appended claims.

318656_1.DOC